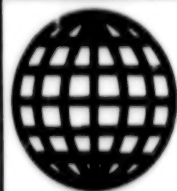


JPRS-ULS-92-001  
3 JANUARY 1992



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# ***JPRS Report***

# **Science & Technology**

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***USSR: Life Sciences***

# Science & Technology

## USSR: Life Sciences

JPRS-ULS-92-001

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3 January 1992

**NOTICE TO READERS:** Given the course of events in the former Soviet Union, FBIS will change the titles of its Soviet publications to "Central Eurasia" on 6 January. The "USSR: Computers" report will be renamed "Central Eurasia: Computers".

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**Physiological Basis of Dextrel Use as Retardant**

917C0616A Kiev *FIZIOLOGIYA I BIOKHIMIYA KULTURNYKH RASTENIY in Russian* Vol 23 No 1, Jan-Feb 91 pp 45-51

[Article by V. G. Kuryata, T. M. Davizhuk and V. P. Lobov, Vinnitsa State Pedagogy Institute imeni N. Ostrovskiy; Institute of Plant Physiology and Genetics, Ukrainian Academy of Sciences, Kiev]

UDC 581.144

[Abstract] Dextrel is a comparatively new Soviet ethylene-producing preparation used to synchronize the maturation of tomatoes. This article studies the biological activity of this preparation, its effect on physiological functions which are integrated with growth and the productivity of raspberries. Experiments were performed in 1987-1989, involving treatment with 0.2-0.4 percent aqueous solutions of dextrel in April and May. Treatment was performed in the morning with back sprayers, fully wetting all leaves. A control group of plants was sprayed in the same manner with tap water. Changes were found in pigment composition and functional activity of raspberry leaf chloroplasts which might be a result of inhibition of the attracting activity of growth zones and a decrease in assimilate demand. The treatment was found to improve cold resistance of the shoots, increase the harvest and the quality of the berries produced. Figures 3; references 16: 14 Russian, 2 Western.

**Effects of Biostimulant Ketostim on Cotton**

917C0669A Moscow *KHIMIZATSIYA SELSKOGO KHOZYAYSTVA in Russian* No 3, Mar 91 pp 26-28

[Article by I. A. Umarov and A. U. Kariyev, cand. biol. sci., and S. I. Iskandarov, doct. chem. sci., Institute of Plant substance Chemistry, Uzbek SSR Academy of Sciences]

UDC 631.811.98:633.51

[Abstract] Field trials with S-4880 cotton variety demonstrated the efficacy of ketostim, a novel plant growth factor, in accelerating maturation and improving crop yields. Ketostim, a water-soluble, nontoxic substance with a MW of 224 and a  $T_m$  of 30 g/ton, which ensured a germination rate of 87.0 percent (vs. 80.0 percent for control plants) and improved harvests by an average of 3 quintals/ha. Tables 2.

**Effects of Mefluidide on Frost Resistance and Chloroplast Structure of Winter Wheat**

917C0670A Moscow *SELSKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian* No 1, Jan-Feb 91 (manuscript received 1 Nov 89) pp 125-131

[Article by N. V. Astakhova, T. I. Trunova, G. N. Kukhalis, G. V. Novitskaya and P. H. Li, Institute of Plant Physiology imeni K. A. Timiryazev, USSR Academy of Sciences, Moscow; University of Minnesota, St. Paul, MN, USA]

UDC 633.11"324":58.036.5:581.174.1

[Abstract] Trials were conducted with the American plant growth regulator mefluidide on winter wheat *Triticum aestivum* Mironovskaya 808 in order to determine its mechanism of action in engendering frost resistance. The results showed that spraying cold-hardened 40-day-old plants with 2 mg/L of mefluidide five days before exposure to -13°C assured a 90 percent survival rate, versus 30 percent for untreated control plants. In the case of unhardened plants 70 percent survival was obtained by mefluidide (2 mg/L) pretreatment three days before freezing at -6°C, versus zero survival of untreated plants. Ultramicroscopic studies on the leaves revealed that mefluidide treatment increased the area of chloroplasts and plastoglobules by ca. 20 percent and the number of grana by ca. 42 percent. Concomitantly, the concentration of polar lipids was increased by 11.4 percent. Evidently, enhancement of frost resistance by mefluidide rests to some extent on an increase in the rate lipid and chlorophyll biosynthesis. Figures 2; tables 2; references 15: 7 Russian, 8 Western.

### Implantation of Human ApoAI Gene Into Old Animals

917C0579A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 316 No 5, Feb 91 pp 1264-1267

[Article by V. V. Frolkis, V. A. Kordyum, L. N. Bogatskaya et al; Institute of Gerontology; USSR Academy of Medical Sciences, Kiev; Institute of Molecular Biology and Genetics; UkSSR Academy of Sciences, Kiev]

UDC 577.21:616.13-004.6:612.67

[Abstract] Implantation of ApoAI gene to increase endogenous synthesis of apolipoprotein AI and increase the content of antiatherogenic high density lipoproteins tested the possibility of using this approach in experimental therapy of atherosclerosis. Adult and old rats received injection of the genetic material into the liver after partial laparotomy at the rate of 100 µg of liposomes suspension to 100 g of body weight (1 ml of suspension contained 13 mg of lipids and 400 µg of plasmid DNA). Control rats received physiological solution and liposomes without genetic material. Intrahepatic injection of the molecular construction containing human ApoAI gene was accompanied by appearance of human apolipoprotein AI blood in both groups of rats. Human ApoAI level in blood of rats varied from 4-6 µg in old rats to 8-10 µg/ml in adult rats. Precipitation did not occur in control rats. Apolipoprotein AI was not found in the blood of either group of rats after seven days. The study was one of the first attempts to implant the gene into old rats and study the age-related features of their response reaction. The study indicated the advisability of further study of age-dependent reactions of the organism to injection of cloned ApoAI gene in the search for possible methods of genetic therapy of experimental atherosclerosis. References 14: 8 Russian, 6 Western.

### Active Immunization Against Exogenous and Endogenous Antidepressants. Formation of Antibodies to Biogenic Amines and Peptide Regulators

917C0580A Moscow BIOLOGICHESKIYE NAUKI in Russian No 2, Mar 91 (manuscript received 15 Oct 90) pp 15-24

[Article by I. P. Ashmarin, M. F. Obukhova, A. A. Martyanov, R. A. Danilova, N. Ye. Babskaya, Z. I. Storozheva, G. K. Grechko, and N. V. Kuznetsova; recommended by the Division of Human and Animal Physiology, Moscow State University imeni M. V. Lomonosov]

UDC 612.017:577.175.8

[Abstract] In this work, the authors found that active immunization of rabbits and white rats against the antidepressant sydnophen leads to the formation of

antibodies that bind to norepinephrine, dopamine, serotonin, and the peptide regulators substance P, dynorphin, vasopressin, and β-endorphin. Immunization against the endogenous antidepressant thyroliberin induces the formation of antibodies to the same biogenic amines and to γ-aminobutyric acid, oxytocin, and leu-enkephalin. The obtained data allowed the authors to evaluate the character of antibody genesis during immunization against selected antidepressants and to formulate a basis for analyzing previously identified physiological and biochemical shifts caused by immunization. The number of phenomena accompanying failures in immunotolerance that have been difficult to explain has increased. The authors hope that a detailed analysis of the biochemical and physiological shifts during immunization against sydnophen and thyroliberin, considering the directed activity of the formed antibodies, will allow them to obtain additional information. Figures 3; references 12: 6 Russian, 6 Western.

### Effect of Substance P on the Individual and Group Behavior of Rhesus Macaque Monkeys

917C0580B Moscow BIOLOGICHESKIYE NAUKI in Russian No 2, Mar 91 (manuscript received 21 Mar 89) pp 83-90

[Article by M. L. Butovskaya, M. A. Deryagina, and V. G. Startsev; recommended by the Division of Anthropology, Moscow State University imeni M. V. Lomonosov]

UDC 572.11.4:599.82

[Abstract] In this work, characteristics of substance P's effect on the manifestation of individual and group behavior of adult male rhesus macaques were studied on a background of cardiopathogenic stress and without it. Cardiopathogenic emotional stress had a stimulating effect on the general activity of rhesus macaques in individual cages, whereas an injection of substance P without stress increased the frequency and duration of pathological behavior elements. The effect of substance P reached a maximum on the third to fourth day of the experiments. When the individuals were placed in a common cage, intensified movement and social activity were observed on the fifth day. A definite correlation was established between arterial pressure before and after the experiments and the animals' social ranks. The injection of substance P on a background of stress and without it was most difficult for the second-ranking individuals to endure and easier for others—the leaders of the group and the most subordinate males. References 11: 7 Russian, 4 Western.

### Fe<sup>2+</sup>-Induced Lipid Peroxidation as Factor in Bioluminescent Activity of Bacterial Luciferase

917C0593A Moscow BIOKIMIYA in Russian Vol 56 No 3, Mar 91 (manuscript received 20 Jun 90) pp 477-486

[Article by L. V. Beriya, A. D. Ismailov and V. S. Danilov, Chair of Microbiology, Biological Faculty, Moscow State University]

UDC 577.152.3

[Abstract] Biochemical studies were performed on cell-free suspensions of *Vibrio harveyi* to determine the mechanism responsible for intense bioluminescence based on the luciferase mechanism. The study revealed that  $\text{Fe}^{2+}$  ions were involved in luminescence in the absence of exogenous aldehyde factor. The exact mechanism was represented by  $\text{Fe}^{2+}$ -induced lipid peroxidation resulting in aldehyde formation. The coefficient of correlation between bioluminescence and lipid peroxidation reaching 0.98. GLC revealed that unsaturated fatty acids (UFA) represent ca. 80 percent of the cellular fatty acid in the suspensions. Consequently, these observations strongly suggest that bacterial UFA serve as the source of the endogenous aldehyde substrate for luciferase. Figures 6; tables 1; references 27: 5 Russian, 22 Western.

**Isolation and Characterization of Extracellular *Serratia marcescens* Nuclease Isoenzymes**

917C0593B Moscow BIOKHIMIYA in Russian Vol 56 No 3, Mar 91 (manuscript received 25 Jun 90) pp 508-520

[Article by M. N. Filimonova, A. A. Dementyev, I. B. Leshchinskaya, G. Yu. Bakulina and S. V. Shlyapnikov, Kazan State University imeni V. I. Ulyanov-Lenin; Institute of Molecular Biology imeni V. A. Engelgardt, USSR Academy of Sciences, Moscow]

UDC 577.152.3

[Abstract] *Serratia marcescens* nuclease (SMN; EC 3.1.30.2, formerly EC 3.1.4.9—Abstractor) has gained in importance in view of its utility in genetic engineering and as a putative antiviral. Recent studies on the isolation of SMN from *S. marcescens* B10 M1 by chromatographic techniques led to isolation of two isoenzymes. The relative yields of the two isoenzymes were on the order of 13 (1) and 25 (2) percent following purification on ion-exchange chromatography on phospho- and DEAE-cellulose columns, with specific activities of  $3.6 \times 10^6$  and  $4.0 \times 10^6$  U/mg of protein, respectively. Further, the pI values of SMN-1 and SMN-2 were 7.3 and 6.8, respectively, and SMN-2 was found to contain an additional Asp-Thr-Leu tripeptide at the N-terminus. Tryptic fingerprint patterns and disposition of disulfide bonds for the two isoenzymes were identical. On balance, SMN has been shown to be quite similar to nucleases previously isolated from *S. marcescens* W225 and SM6. Figures 8; tables 2; references 18: 9 Russian, 9 Western.

**New, Specific Protein for Photoreceptor Cells With Molecular Weight of 26 kDa Capable of Binding to Immobilized Delipidized Rhodopsin**

917C0594 Moscow BIOKHIMIYA in Russian Vol 56 No 2, Feb 91 pp 225-229

[Article by A. M. Dizhur, E. N. Nekrasova and P. P. Filippov; Interdepartment PNIL of Molecular Biology

and Bioorganic Chemistry imeni A. N. Belozerskiy; Moscow State University imeni M. V. Lomonosov]

UDC 577.354.25

[Abstract] A protein with molecular weight of 26 kDa (p 26), capable of binding to delipidized rhodopsin immobilized on Concanavalin A-Sepharose was detected in photoreceptor cells of bovine retina. Monospecific antibodies against this protein were obtained and used to demonstrate that p26 is located in both external and internal segments of the photoreceptor cells. Antigenic properties of p26 differed from those of all known photoreceptor proteins. Figures 3; references 6: 1 Russian, 5 Western.

**Genes Encoding Hybrid Human Lymphokines. Part 1. Recombinant Plasmids Encoding Hybrid Human Immune Interferon (IFN- $\gamma$ ) and Tumor Necrosis Factor (TNF)**

917C0596A Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 2, Feb 91 (manuscript received 17 May 90) pp 189-196

[Article by V. G. Korobko, I. V. Davydov, L. N. Shingarova, S. A. Filippov (dec.), D. S. Yesipov, N. P. Berkova and V. N. Dobrynin, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 577(214.625+217.52):577.113.6

[Abstract] IFN $\gamma$ , TNF $\alpha$  and lymphotoxin (TNF $\beta$ ) have been shown to act synergistically in certain situations, leading to studies on the construction of INF $\gamma$ -TNF $\alpha$  and INF $\gamma$ -TNF $\beta$  hybrid molecules. Accordingly, site-directed mutagenesis was employed on the C-terminal end of the INF $\gamma$  gene to induce replacement of AT bp by a TC combination, leading eventually to replacement of Ser-143 by Pro in the INF $\gamma$  molecule and creation of a recognition site in the gene for restriction endonuclease SacI. Fusion of the INF $\gamma$  gene with either TNF $\alpha$  or TNF $\beta$  gene was accomplished with synthetic oligonucleotide linkers and unique sites for XhoI and SmaI in the N-end of the semisynthetic TNF $\alpha$  and TNF $\beta$  genes. Transformation of *E. coli* by recombinant plasmids resulted in gene expression. Immunoblotting studies on the hybrid molecules demonstrated that both were subject to partial degradation, the INF $\gamma$ -TNF $\beta$  more so than INF $\gamma$ -TNF $\alpha$ . Figures 5; references 29: 2 Russian, 27 Western.

**Monoclonal Antibodies in ELISA for Phytoviruses**

917C0596B Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 2, Feb 91 (manuscript received 15 Feb 90) pp 223-231

[Article by T. N. Plechko, A. V. Kirillov, A. M. Ambrosova, O. V. Borisova\* and A. G. Odinets\*, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR



Academy of Sciences, Moscow; \*Chair of Virology, Biology Faculty, Moscow State University]

UDC 578.85/86.083.3

[Abstract] Conventional methods were used for the preparation of monoclonal antibodies against Arabis mosaic virus (AMV) and tested in direct and indirect ELISA methods. The results demonstrated that the monoclonal IgM was unsuitable for further application because of relatively low sensitivity (30-60 ng/ml) and specificity in that it reacted with components of plant juice other than AMV. A monoclonal IgG (3B4) demonstrated required specificity and a sensitivity of 2-3 ng/ml, on par with that obtained with polyclonal rabbit antibodies in sandwich ELISA. The 50 percent binding constant of this monoclonal antibody was on the order of  $3.5 \times 10^9 \text{ M}^{-1}$ . In addition, this particular monoclonal IgG was also successfully used in a latex agglutination test with a sensitivity of 2-4 ng/ml of AMV, i.e., a sensitivity equivalent to that of ELISA. Figures 8; tables 1; references 13: 3 Russian, 10 Western.

#### Affinity Chromatography of DNA Fragments and Oligonucleotides With Blocked Internucleotide Phosphate Groups

917C0596C Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 2, Feb 91 (manuscript received 31 Jul 89; in final form 2 Apr 90) pp 232-240

[Article by T. V. Abramova, N. V. Amirkhanov, V. V. Gorn, V. F. Zarytova, Ye. I. Frolova and N. G. Shishkina, Novosibirsk Institute of Bioorganic Chemistry, Siberian Branch, USSR Academy of Sciences]

UDC 577.113.083:543.544

[Abstract] Affinity chromatography was used for separation of chemically synthesized homo- and heterooligonucleotides. In one case a 34 bp ( $N_{34}$ ) oligonucleotide representing a deoxy copy of tick-borne encephalitis virus (TBEV) RNA was isolated from a LiChrosorb- $\text{NH}_2$  conjugated with a 17-base long oligonucleotide fragment complementary to the 5'-end of the  $N_{34}$  TBEV fragment. In another approach Polysil CA, bearing the immobilized hexadecanucleotide pTGAC-CCTCTTCCCAT complementry to a 302 base long single-stranded DNA version of TBEV RNA was effective in the isolation of the 302 base sequence. In both cases the products were of higher purity than obtained with GLC. In addition, LiChrosorb- $\text{NH}_2$  conjugates with  $pA_{14}$  was found effective in separating the diastereoisomers  $[\text{Tp}'(\text{Et})\text{Tp}]_4$  and  $[\text{Tp}''(\text{Et})\text{Tp}]_4$  at 40°C, since the complexes which these compounds form with the adsorbent have melting points of 6 and 29°C, respectively. The fact that the affinity columns can be regenerated for multiple use further enhances their utility. Figures 6; references 14: 10 Russian, 4 Western.

#### Temporary Protective Groups in Synthesis of Oligonucleotides With Unconventional Bonds

917C0596D Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 2, Feb 91 (manuscript received 30 Jan 90; in final form 12 Apr 90) pp 241-245

[Article by V. V. Samoshin, Yu. Ye. Khudyakov and V. D. Smirnov, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

UDC 547.963.32.057:577.113

[Abstract] The H-phosphonate method for oligonucleotide synthesis has been modified to allow synthesis of products containing a specific number of internucleotide phosphamide bonds at selected positions. The use of alkoxy groups to block the phosphorus atoms precluded their reaction with amine reagents and promoted formation of unnatural phosphamide bonds between nucleotides. Specifically, temporary blockage of the internucleotide phosphates was attained with methanol in a solution of 1-methylimidazole-triethylamine-carbon tetrachloride. Formation of phosphamide bonds involved treatment with the corresponding amine in a mixture of pyridine and carbon tetrachloride. Subsequent steps followed previously described procedures [Froehler et al., Nucl. Acids Res., 27(46):5399, 1986; Oligonucleotide Synthesis, ed. M. J. Gait, IRL Press, 1984, p. 69]. Figures 1; references 12: 2 Russian, 10 Western.

#### Structure of Neurotoxin Tryptic Fragments From Black Widow Spider Venom

917C0608A Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 4, Apr 91 (manuscript received 2 Jul 90) pp 437-441

[Article by T. M. Volkova, T. G. Galkina, A. B. Kubelin, and Ye. V. Grishin; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 577.112.5:595.44-114.52.088

[Abstract] The N-terminated amino acid sequence of neurotoxin from *Latrodectus mactans tredecimguttatus* spider venom ( $\alpha$ -latrotoxin) was determined. For this, electrophoresis of latrotoxin on polyacrylamide gel (PAAG) and then electromigration of the protein band on polyvinylidene difluoride (Immobilon TM; Millipore, USA) were conducted. The immobilized protein was sequenced by automated degradation in a 470A Gas Phase Sequencer (Applied Biosystems, USA) with identification of phenyl thiohydantoic derivatives of the amino acids. Tryptic hydrolysis of the carboxymethyl derivative of latrotoxin was also conducted, resulting in the determination of total or partial sequences of 25 fragments, containing a total of 252 amino acid residues. Structural information needed for synthesizing oligonucleotide probes and for cloning K-DNA, the structural

gene of latrotoxin, was obtained. The authors thanked I. V. Nazimov and V. V. Shemyakin for the automated peptide sequencing. Figures 2; references 12: 4 Russian, 8 Western.

#### Application of Uracyl-Repair Selection for Deleting Extended DNA Sequences

917C0608B Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 4, Apr 91 (manuscript received 28 Feb 90, after revision 15 Oct 90) pp 456-460

[Article by I. I. Shekhter, A. V. Mochulskiy, V. P. Veyko, and V. G. Debabov; All-Union Scientific Research Institute for Genetics and Selection of Industrial Microorganisms, Moscow]

UDC 575.224.4

[Abstract] Site-directed deletion-insertion mutagenesis was conducted with the application of uracyl-repair selection of mutant forms of DNA. The use of a single oligonucleotide (*E. coli* DNA-polymerase I in combination with uracyl-repair selection) made it possible to reconstruct the region for regulating pBR322 plasmid replication. The oligonucleotide deleted a 116-nucleotide fragment, containing RNA (RNAII) ColEI-replicon promoter, and simultaneously inserted four nucleotides to form a BglII restriction recognition site. The plasmid had been cloned into a M13tg131 recombinant phage. It was shown that application of the uracyl-repair system improved the effectiveness of the process by more than 30 times compared to the usual mutagenesis variant. Preliminary calculations with the "DNA-sun" program, developed at the All-Union Scientific Research Institute (VNI) for Genetics, enabled the authors to predict the structural characteristics of the oligonucleotide, conditions for heating it, and an effective system for conducting mutagenesis with it. The authors thanked T. A. Kunkel (Nat. Inst. Environ. Health Sci., USA) for supplying the *E. coli* RZ1032 strain and V. F. Lebedev (VNI for Genetics, Mathematical Modeling Division) for help in conducting calculations of the secondary structure of DNA. Figures 2; references 10: 1 Russian, 9 Western.

#### Synthesis, Cloning, and Expression of Artificial Genes Coding Antigen Determinants of Foot and Mouth Disease Virus Subtype A<sub>22</sub>

917C0608C Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 17 No 4, Apr 91 (manuscript received 29 Aug 90) pp 461-469

[Article by V. G. Korobko, Ye. F. Boldyreva, O. V. Nekrasova, A. Mikulskis, S. A. Filippov (deceased), and V. N. Dobrynin; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

UDC 547.963.320.57:577.214.622

[Abstract] Double-stranded DNA, coding simple or complex antigen determinants of foot and mouth disease virus subtype A<sub>22</sub>, has been chemically-enzymatically

synthesized and cloned into *Escherichia coli*. The simple antigen determinants included amino acid sequences 131-152 or 131-160 of VP<sub>1</sub> virus capsid protein; the complex antigen determinants included an additional amino acid sequence 200-213 of VP<sub>1</sub> protein bound to the N-terminus via a Pro-Pro-Ser-Pro spacer. Recombinant DNA, containing genes of human tumor necrosis factor (TNF) hybrids and simple or complex antigen determinants of foot and mouth disease virus subtype A<sub>22</sub>, was constructed. The expression of hybrid genes in *E. coli* and properties of the proteins coded by them were studied. It was shown that all the recombinant proteins specifically reacted with polyclonal antibodies to TNF and foot and mouth disease virus subtype A<sub>22</sub>. Hybrid proteins produced by the bacterial cells are promising for study as vaccines against the foot and mouth disease virus. The authors thanked V. N. Ivanyushchenkov (VNIYaI, USSR Gosagroprom, Vladimir) for rabbit antiserum against the entire foot and mouth disease virus subtype A<sub>22</sub> and N. P. Berkovaya (Institute of Bioorganic Chemistry imeni M. M. Shemyakin) for polyclonal antibodies against recombinant human TNF. Figures 4; references 19: 7 Russian, 12 Western.

#### Characteristics of Luminol Oxidation Catalyzed by Various Peroxidases

917C0609 Moscow BIOKHIMIYA in Russian Vol 56 No 1, Jan 91 (manuscript received 13 Mar 90) pp 78-84

[Article by Yu. Yu. Kulis, Yu. D. Kazlauskayte, R. A. Vidzhyunayte, and V. Y. Razumas; Institute of Biochemistry, Lithuanian Academy of Sciences]

UDC 577.57.03

[Abstract] Luminol oxidation in a weakly basic hydrogen peroxide medium catalyzed by horseradish peroxidase, lactoperoxidase, peroxidase from *Arthromyces ramosus* fungus, and microperoxidase-11, a heme-containing undecapeptide, proceeded according to the Michaelis-Menten mechanism. Substituted phenols noncompetitively activated the process catalyzed by horseradish peroxidase (*p*-bromophenol, *p*-iodophenol) and lactoperoxidase (*p*-iodophenol). Horseradish peroxidase and microperoxidase-11 formed complexes with *p*-bromophenol, *p*-iodophenol, and *p*-hydroxy biphenyl, while peroxidase from *A. ramosus* did not yield such complexes. Chemiluminescence catalyzed by peroxidase from *A. ramosus* and microperoxidase-11 was not activated by *p*-iodophenol, but both *p*-hydroxy biphenyl and *p*-iodophenol affected the process catalyzed by horseradish peroxidase. A Specord M-40 spectrophotometer (GDR), an MPF-4 fluorimeter ("Hitachi," Japan), and a domestically produced automatic scanning luminometer were used for measurements. The authors thanked Professor R. D. Schmidt (FRG, Brunswick) for supplying peroxidase from *A. ramosus* that had been isolated by Shinmen, et al. Figures 6; references 28: 5 Russian, 23 Western.

**Catalytic Properties of Cholinesterase Immobilized in a Gelatin Membrane**

917C0660A Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 62 No 6, Nov-Dec 90 (manuscript received 3 Jan 90) pp 42-48

[Article by L. P. Kuznetsova, L. I. Kugusheva, and Ye. B. Nikolskaya; Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

UDC 577.15.086.83:577.152.311

[Abstract] A comparative investigation was conducted of the catalytic properties of acetylcholinesterase from human blood erythrocytes (KF 3.1.1.7) and butyrylcholinesterase from horse blood serum (KF 3.1.1.8.) immobilized and nonimmobilized in a gelatin membrane. Cholinesterase immobilization led to increased Michaelis constants and decreased maximum rate values in thiocholine ester enzymatic hydrolysis reactions, but it did not affect these kinetic parameters in the case of indophenylacetate enzymatic hydrolysis. The effects of the reversible inhibitors galantamine, N-methyl-4-piperidyl benzylate, and 1,2,3,4-tetrahydro-9-acridinamine (tacrine), as well as the irreversible inhibitors O-ethyl-O-(4-nitrophenyl)ethyl phosphonate (armin), diisopropyl fluorophosphate (DFP), O,O-diethyl-O-(4-nitrophenyl) phosphate (paraoxon), and O,O-dimethyl-O-(2,2-dichlorovinyl) phosphate (DDVP), on immobilized cholinesterases were weaker in comparison to their effects on nonimmobilized enzymes. The obtained results were discussed from the point of view of the effect of immobilization on the active (in the catalytic sense) surface of enzymes. The results can be used in selecting a cholinesterase with the goal of identifying irreversible inhibitors and in matching an optimum enzyme-substrate system when determining reversible inhibitors with the aid of enzyme-containing gelatin membranes. References 14: 9 Russian, 5 Western.

**Acetylene Amines as Inhibitors of Microsomal Monooxygenases**

917C0660C Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 62 No 6, Nov-Dec 90 (manuscript received 31 Jan 90) pp 98-101

[Article by B. N. Kormilitsyn, N. M. Libman, S. N. Moralev, and V. I. Rozengart; Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

UDC 577.150.4:547.233.3:547.538.2

[Abstract] The activity of acetylene amines, a new class of compounds having structural similarity to known inhibitors of microsomal monooxygenase (SKF-525A), and their saturated analogues against microsomal cytochrome-p-450-dependent monooxygenases was studied in this work. Microsomal cytochrome-p-450-dependent monooxygenases play an important role in the metabolism of

xenobiotics, particularly medicinal preparations and insecticides, as well as endogenic substrates such as steroids and prostaglandins. In experiments with microsomal monooxygenase from mouse liver, significant differences were observed in the sensitivity of oxidation reactions of various substrates. It was shown that the investigated acetylene amines were 13-30 times superior to their saturated analogues in their ability to inhibit amidopyrine and benzo[a]pyrene oxidation and that they differed little with respect to p-nitroanisole and paraoxon oxidation. On the whole, benzo[a]pyrene hydroxylase from house fly abdomens was less sensitive to the investigated compounds than the analogous mouse enzyme; however, in contrast to it, house fly hydroxylase was selective to the diphenyl but not the monophenyl derivatives. These results indicate that further searches for microsomal monooxygenase inhibitors within this class of compounds are promising toward the goal of creating effective and sensitive synergistic pesticides. References 6: 2 Russian, 4 Western.

**Effect of Antioxidants on the Antioxidation System State in Conditions of Ischemic and Reperfusional Brain Damage**

917C0660C Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 62 No 6, Nov-Dec 90 (manuscript received 8 Nov 89) pp 101-105

[Article by G. T. Maslova and T. L. Boboriko; Belorussian State University imeni V. I. Lenin]

UDC 612.824:616.12-008:616.831

[Abstract] The protective activity of the synthetic antioxidants 2,6-di-tert-butyl-4-methylphenol (ionol), o-benzoquinone-2, and ascorbic acid and their effect on the activity of antioxidant enzymes and reduced glutathione (GSH) and the level of diene conjugates in the mitochondrial fraction during ischemic and reperfusional brain damage were studied. Increased activity of antioxidation system enzymes, induced by the accumulation of lipid peroxidation products, was shown during the post-ischemic period: glutathione peroxidase (KF 1.11.1.9)—by 159 percent, glutathione reductase (KF 1.6.4.2)—by 26 percent, and catalase (KF 1.11.1.6)—by 79 percent. Administration of antioxidants caused the level of diene conjugates to decrease to control values, and the effect described above disappeared. It was concluded that the antihypoxia activity of the investigated antioxidants, which was most pronounced in ortho-benzoquinone-2, which guaranteed a survival rate not only after 5, but also after 15 minutes of total circulatory ischemia, resulted from their antiradical properties and was not associated with stimulation of the activity of enzymes that support peroxide homeostasis. References 15: 12 Russian, 3 Western.



**Isolation of Nucleases From *Serratia Marcescens* Culture Fluid by Carboxylated Cationic Exchange Resin Biocarb**

917C0585A Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 10 May 89) pp 186-188

[Article by M. N. Filimonova and R. B. Ponomareva, Kazan State University]

UDC 577.152.314:57.088.3

[Abstract] The endonuclease (EC 3.1.4.9) produced by *Serratia marcescens* has been shown to be effective as an antiviral in veterinary practice, leading to refinements in its recovery from culture fluid. Trials with Biocarb D-24 columns showed that this carboxylated cation exchange resin adsorbs the enzyme efficiently in 0.1 M tris-acetate buffer, pH 5.2. Elution with 0.5 M tris-acetate buffer, pH 8.9 yielded 100-fold concentration of the endonuclease with retention of 91 percent of initial activity and a 65-fold rise in specific activity. Figures 2; tables 1; references 11: 9 Russian, 2 Western.

**Extracellular  $\beta$ -Fructofuranosidase of Mutant *Penicillium Canescens* 20171**

917C0585B Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 24 Apr 89) pp 189-195

[Article by Ye. T. Lomkatsi, A. T. Shkolnyy, M. M. Gomarteli, A. K. Tsereteli, M. D. Dzobava, T. I. Bilay and G. I. Kvesitadze, Institute of Plant Biochemistry, Georgian SSR Academy of Sciences, Tbilisi; Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev]

UDC 577.152.32

[Abstract] UV-induced mutagenesis was employed on *Penicillium canescens* 20171, a producer of  $\beta$ -fructofuranosidase (EC 3.2.1.26), in order to increase production of the enzyme which is finding wide application in the food industry, agriculture and analytical biochemistry. Screening resulted in the isolation of *P. canescens* mutant, designated No 14-30 AME-85, which exhibits a level of  $\beta$ -fructofuranosidase production that exceeds parental production 200-280 percent. This mutant strain retained high productivity for four years. Enzyme activity was not affected by dialysis against distilled water nor by day-long exposure to 0.001-0.1 M NaCl, KCl,  $MgSO_4$ ,  $MgCl_2$ ,  $Mn_2$ ,  $MnSO_4$ ,  $CuSO_4$  or  $Fe_4$ . In addition, the enzyme retained its activity for two years at +10°C and displayed typical acid tolerance and high temperature optimum (55-60°C, 2 h). Figures 1; tables 6; references 20: 12 Russian, 8 Western.

**Determination of Rubber Polymerase in *Hevea Brasiliensis* Latex**

917C0585C Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 18 Apr 89) pp 202-215

[Article by O. A. Yevdokimova, N. G. Sosnovskaya, A. V. Shcheulin and V. V. Moiseyev, Voronezh Branch, All-Union Scientific Research Institute of Synthetic Rubber]

UDC 577.152.278+678

[Abstract] Lyophilized latex of *Hevea brasiliensis* was analyzed to determine factors promoting synthesis of natural rubber, a topic gaining in importance in view of recent advances in biotechnology. Fractionation of the latex on Ultragel Aca-34 columns yielded fractions A, B and C, the first of which contained rubber particles and ca. 30 percent protein. Analysis of rubber polymerase (prenyl transferase, EC 2.5.1.20) in terms of incorporation of  $^3H$ -isopentenyl pyrophosphate, using the rubber particles as the acceptor, showed that the lyophilized latex contained all the components needed for rubber synthesis. Fraction A, however, was incapable of rubber synthesis in the absence of cofactors  $Mg^{++}$  and GSH. Addition of the cofactors increased the rate of synthesis 1.5- to 2-fold. B and C fractions possessed rubber polymerase activity, but the specific activity of fraction C was 3- to 4-fold greater than that of fraction B. Furthermore, the activities of these two fractions were unaffected by Tween-20. Reconstructed latex had lower activity than that of fraction C and was on level of the B fraction or even lower. Evidently, an inhibitory factor is present in fraction B, but its nature and mechanism of action remains to be defined. Figures 2; tables 4; references 10: 1 Russian, 9 Western.

**Immobilization of *Pseudomonas Fluorescens* 16N2 Cells on Cellulose Triacetate Fibers**

917C0585D Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 6 Apr 89) pp 210-215

[Article by Ye. N. Kozlyak, Z. G. Solomon, M. M. Yakimov, T. V. Fdyushina, G. N. Germanskiy, I. B. Utkin, I. S. Rogozhin, B. L. Biber and A. M. Bezborodov, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; 'Khimvolokno' Scientific industrial Association, Mytishi]

UDC 579.24

[Abstract] Trials were conducted on efficient methods of immobilization of *Pseudomonas fluorescens* 16N2 on cellulose triacetate fibers for possible use in degrading hydrocarbon pollutants. Immobilization was complicated by the fact that the solvent used in fiber production, dichloromethane, is bactericidal to *Ps. fluorescens*, reducing viability counts by three orders of magnitude

after 30 min of contact. However, high concentrations of cellulose triacetate polymer were observed to enhance bacterial viability by two orders of magnitude. This phenomenon made it possible to prepare an active preparation of immobilized cells, albeit with a prolonged induction time. Maximum degradation of benzene, m-xylene and undecane required a 72 h induction period in culture medium, although degradation of the latter two compounds commenced with a 1.5 to 3 h lag time. Maximum biocatalytic activity coincided with replenishment of intracellular ATP pool and persisted for 40 days with periodic changing of the culture medium. Tables 3; references 19: 10 Russian, 9 Western.

### Bacterial Desulfuration of Oil Shale

917C0585E Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 11 May 89) pp 222-227

[Article by A. V. Belyy, L. S. Anisova, G. V. Denisov and N. A. Gladchenko, Institute of Biophysics, Siberian Branch, USSR Academy of Sciences, Krasnoyarsk]

UDC 622.775:576.8

[Abstract] Determinations were made of the optimum conditions favoring sulfur removal from oil shale by *Thiobacillus ferrooxidans* isolated from shale sites. The oil shale samples contained 3.06 percent, 0.61 percent represented by orthonosulfur compounds. The relative ratios of bacteria, iron and shale determined the efficiency of bacterial desulfuration and optimum ratios consisted of 4:1:200 in batch mode. In the latter case ca. 50 percent of the sulfur was removed after about 20 h. In continuous mode optimum conditions consisted of a flow rate of  $0.0156 \text{ h}^{-1}$ , 2.5-5 g/L of *Th. ferrooxidans*, and 200 g/L of shale, yielding ca. 50 percent desulfuration after 14-17 h. Figures 6; references 13: 7 Russian, 6 Western.

### Interrelationship Between Accumulation and Utilization of Fatty Acids and Amino Acids in Thermophilic Methanogenesis on Concentrated Organonitrogen Substrate

917C0585F Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 19 Jul 89) pp 235-245

[Article by Ye. S. Pantskhava, S. Kh. Tapaltsyan, Ye. G. Matveyeva, Ye. V. Savidenko, A. A. Bezzubov, G. L. Shaposhnikova and G. S. Kaloshina, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

UDC 576.8

[Abstract] Amino and fatty acid dynamics were monitored for 70 days during thermophilic fermentation of chicken droppings and biogas production. The results

demonstrated a definite, time-dependent, interrelationship between amino and fatty acid levels in the substrate and de novo production of bacterial biomass and protein. On balance, the results demonstrated that in the initial 11 days there was massive accumulation of volatile  $\text{C}_2 - \text{C}_3$  and higher  $\text{C}_6 - \text{C}_9$  fatty acids formed by deamination, dehydrogenation and decarboxylation of substrate amino acids. Transition to active methanogenesis and biomass production was accompanied by reconversion of the fatty acids to amino acids and their utilization in the synthesis of bacterial protein. The exact mechanism(s) by which fatty acids are converted to amino acids remains enigmatic but apparently is related to anaerobic conditions and excess ammonia ion. Figures 5; tables 3; references 5: Russian.

### Identification of Microorganisms From Rate of Agglutination by Lectins(tab)

917C0585G Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 26 Apr 90) pp 274-278

[Article by N. N. Nutsbidze, V. M. Lakhtin, V. A. Demina, I. N. Obratsova and D. N. Marinova, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; Institute of Plant Biochemistry, Georgian SSR Academy of Sciences, Tbilisi]

UDC 577.152

[Abstract] A lectin derived from lentil and specific for  $\alpha$ -D-mannose,  $\alpha$ -D-glucose and L-fucose residues of oligosaccharide conjugates of mycelial fungi was employed in agglutination studies to determine its utility in fungal identification. The experimental approach involved measuring the OD of the fungal suspensions at 578 nm for 5 min in 0.1 M phosphates buffer, pH 6.0, at 25°C in the presence of  $2.5 \times 10^{-7} \text{ M}$ . Studies with *Trichoderma reesei*, *Neurospora crassa*, *Trichoderma longibrachiatum* and *Phanerochaete chrysosporium* showed that the abatement in OD with time provided a means of species and intraspecies identification, including daughter cells derived by protoplasmic fusion of parental cells. Since identification was also possible in the case of a hybrid formed from fusion of *P. chrysosporium* and *T. longibrachiatum* protoplasts, this approach to identification obviously lends itself to analysis of recombinant strains. Figures 4; references 12: 6 Russian, 6 Western.

### Production of Tropane Alkaloids by Transformed Cultures of *Datura Innoxia* Roots

917C0585H Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 20 Mar 89) pp 286-291

[Article by V. P. Bulgakov, Yu. N. Zhuravlev and I. V. Toroptseva, Soil Biology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]



UDC 581.143.6:615.4

[Abstract] Transformation studies on *Datura innoxia* were performed to determine the feasibility of enhanced yields of commercially valuable tropane alkaloids. The experimental approach consisted of stem inoculation with *Agrobacterium rhizogenes* and in vitro cultivation of the resultant galls under defined conditions. Long-term cultivation yielded hairy root formation further cultured without exogenous phytohormones. The roots displayed a high growth index of 37 and accumulation of tropane alkaloids to a level equivalent to 0.76 percent of dry biomass. Figures 3; tables 1; references 12: 1 Russian, 11 Western.

#### Identification of Dimethyl Terephthalate-Degrading Microorganisms

917C0585I Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 2, Mar-Apr 91 (manuscript received 6 Mar 89) pp 292-298

[Article by A. S. Samsonova, Z. M. Slizen and N. L. Markova, Institute of Microbiology, Belorussian SSR Academy of Sciences, Minsk]

UDC 57.083.12:547.548:530.112

[Abstract] Detection of dimethyl terephthalate (DMT)-degrading bacteria was achieved by conventional plaque technique, using DMT as the sole carbon source in a mineral agar medium. Bacteria utilizing DMT can be identified by the formation of clear zones around active colonies as a result of breakdown of the DMT crystals. Furthermore, metabolic efficiency in DMT degradation can be inferred from the diameter of the clear zone. This method led to the identification of *Rhodococcus erythropolis* 102 as one of the more active utilizers of DMT. Figures 2; tables 2; references 10: 5 Russian, 5 Western.

#### Degradation of Polycyclic Aromatic Hydrocarbons (PAH) by *Pseudomonas fluorescens* 16N2

917C0597A Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 8 Jan 90) pp 76-81

[Article by I. B. Utkin, M. M. Yakimov, L. N. Matveyeva, Ye. I. Kozlyak, I. S. Rogozhin, Z. G. Solomon and A. M. Bezborodov, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

UDC 579.841.11

[Abstract] An analysis was conducted on the metabolism of PAHs by *Pseudomonas fluorescens* 16N2 in order to define the applicable catabolic pathways. Growth on naphthalene was accompanied by induction of gentisate-1,2-dioxygenase and catechol-1,2-dioxygenase. Metabolic transformation of anthracene by cells grown on

hexadecane resulted in the production of 3-hydroxy-2-naphthoate and salicylate. These observations indicate, therefore, that catabolism of naphthalene proceeds according to the following sequence: naphthalene [arrow to] salicylate, with salicylate converted to gentisate and catechol which then undergo ring disruption. Anthracene metabolism involves initial transformation to 3-hydroxy-2-naphthoate which is then converted to salicylate. Figures 4; tables 2; references 24: 3 Russian, 21 Western.

#### Poly-B-Hydroxybutyrate (PBHB) Levels in Methylophilic Bacteria Differing in Primary Methanol Utilization

917C0597B Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 28 Nov 88) pp 98-101

[Article by N. I. Govorukhina and Yu. A. Trotsenko, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

UDC 579.222.4+577.3

[Abstract] Monitoring studies were conducted on the levels of accumulation of PBHB in various methylophilic bacteria in view of the increasing importance of PBHB in pharmaceutical biotechnology, agriculture, and microelectronics. Cultivation on 0.5 percent methanol showed that the lowest levels of accumulation (0-0.4 percent wt. dry biomass) occurred in obligate methylophilic bacteria relying on the ribulose monophosphate pathway (RMP), intermediate levels (6-13 percent) in autotrophic methylophilic, and high levels (7-80 percent) in facultative methylophilic bacteria relying on serine pathway or RMP for C<sub>1</sub> assimilation. Highest accumulation was exhibited by *Pseudomonas rhodoc* TK0010 (76 percent) and *Protonobacter ruber* TK003 (80 percent), bacteria that show ca. 90 percent DNA homology. The levels of PBHB accumulation correlated directly with survival rates on storage in the stationary phase of growth. On balance these findings indicate that facultative, nonpigmented methylophilic bacteria utilizing the serine pathway represent the most promising sources of PBHB. Figures 1; tables 1; references 14: 1 Russian, 13 Western.

#### Organic Matter Concentration and Amino Acid Dynamics in Anaerobic Digestion of Chicken Droppings

917C0597C Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 28 Jun 89) pp 108-116

[Article by Ye. S. Pankhava, S. Kh. Tapaltsyan, Ye. V. Davidenko, G. L. Shaposhnikov and G. S. Kaloshina, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

UDC 576.8

[Abstract] Consideration of animal wastes as an increasingly important resource in biotechnology led to an evaluation of interrelationship between moisture content of chicken droppings, amino acid dynamics and biogas production in anaerobic digestion. Digestion was conducted for 30 days in 0.5 L sealed reactors filled with argon, using droppings with a 75 (Exp-1) and a 90 percent (Exp-2) moisture content. Monitoring 17 amino acids and other parameters demonstrated that in Exp-1 1.0 L of biogas was produced with a composition of 24 percent methane and 76 percent carbon dioxide. The amino acids in highest concentrations were histidine (19 percent), asparagine (8.4 percent), glycine (6.5 percent), alanine (14.5 percent), leucine (8.3 percent), while methionine was present in the lowest concentration (0.65 percent). Total concentration of amino acids decreased from 2176 mg/100 g to 619 mg/100 g, a 3.5-fold drop. In Exp-2 1.5 L of biogas was produced (40 percent methane, 60 percent carbon dioxide), total amino acid concentration fell from 835 to 224 mg/100 g, i.e., a 3.8-fold decrease, and the amino acids in highest concentrations were asparagine (17 percent), glutamine (12 percent) and alanine (9.8 percent), while cysteine disappeared completely. In the starting substrate the amino acids in highest concentrations were lysine (7.6-7.8 percent), asparagine (9.1-10.9 percent), glutamine (15.4-15.6 percent), proline (12.3-12.4 percent), leucine (7.7-7.8 percent) and phenylalanine (7.3-7.4 percent). Concomitant with the amino acid dynamics ammonia ions continued to accumulate and reflected total amino acid decrement over the 30 day period. The data indicate that the degree of organic conversion was on the order of 6 percent in Exp-1 and 22 percent in Exp-2, and that proteolysis and deamination are not effected by high ammonium ion concentrations. Figures 5; tables 3; references 11: 9 Russian, 2 Western.

#### Effects of Succinic Acid Sulfur Derivatives on Bacterial Bioluminescence

917C0597D Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 13 Aug 89) pp 127-133

[Article by V. A. Kratasyuk, V. I. Makurina, A. M. Kuznetsov, N. S. Kudryashova, N. B. Plotnikova, S. Ye. Medvedeva, I. S. Gritsenko and V. P. Chernykh, Institute of Biophysics, Siberian Branch, USSR Academy of Sciences, Krasnoyarsk]

UDC 615.31:547.461.4

[Abstract] In view of the use of bacterial luminescence as an environmental indicator, an analysis was conducted on the effects of relative lipophilicity of organic compounds on in vivo and in vitro bioluminescence. In vivo studies were performed with *Photobacterium phosphoreum* IBF-1 and in vitro with luciferase preparation of *Ph. leiognathi*. Two series of structurally distinct

sulfur derivatives of succinic acid were employed: N-(arylsulfonamido)succinamides and hydrox. amides of arenesulfohydrazides. In vivo studies showed enhancement, inhibition, or lack of effect. In broad outline, lipophilic agents tended to enhance bioluminescence while hydrophilic agents possessed quenching properties. Certain lipophilic agents that bound too tightly to cell wall components to gain ingress were without effect. In the in vitro system inhibition was obtained with every compound tested and the degree was side group-dependent. In the case of the imides at  $10E-8$  to  $10E-6$  M concentrations quenching diminished in the following sequence:  $H > CH_3 > CH_3 > Br > NO_2 > Cl$ ; for the hydroxyamides the relationship was  $Cl > Br > NO_2 > CH_3O > H > CH_3$ . These observations demonstrated the importance of lipophilicity in the utility of bacterial bioluminescent systems in detection of environmental pollutants. In addition, such systems may also be used to study permeability mechanisms in bacteria. Figures 2; tables 3; references 18: 1 Ukrainian, 15 Russian, 2 Western.

#### Improved Bioluminescent Method for Bacterial Biomass Determination

917C0597E Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 4 Nov 88) pp 134-141

[Article by L. Yu. Brovko, I. Yu. Trdatyan and N. N. Ugarova, Moscow State University]

UDC 579.088;577.158.54

[Abstract] Conventional bacterial biomass determination relying on analysis of bacterial ATP by firefly luciferase reaction was modified in order to improve the sensitivity of the system. Studies with *Beneckea harveyi* showed that filtration and immobilization of bacteria can result in a 100- to 300-fold improvement in sensitivity. Filtration of bacteria on Type A Whatmann or Synpor (Czechoslovakia) filters with 0.3  $\mu$ m diameter pores improved sensitivity to  $10E3$  cells/ml (ca. 1  $\mu$ g/ml). Immobilization of the cells on titanium hydroxide improved sensitivity to ca. 500 cells/ml. Additional experiments demonstrated that the technique could be extended to determination of bacteria in association with somatic cell. Incubation of fibroblasts and *E. coli* mixtures with titanium hydroxide resulted in preferential destruction of ATP in somatic cells, leaving bacterial ATP for quantification by the luciferase method. Figures 3; tables 2; references 9: 5 Russian, 4 Western.

#### Effect of pH on Luminescence Decay Constants of Luminous Bacteria

917C0597F Moscow PRIKLADNAYA BIOKIMIYA I MIKROBIOLOGIYA in Russian Vol 27 No 1, Jan-Feb 91 (manuscript received 17 Apr 89) pp 142-146

[Article by G. A. Primakova and T. P. Sandalova, Institute of Biophysics, Siberian Branch, USSR Academy of Sciences, Krasnoyarsk]

UDC 576.581.162.095:577.158.54.01

[Abstract] Comparative analysis was conducted on the decay constants of the luminescent bacteria *Vibrio harveyi*, *Vibrio fischeri*, *Photobacterium leiognathi* and *Ph. phosphoreum* in relation to pH and substrate (lauric, myristic and decyl aldehydes). Measurements were performed in 0.1 M phosphate buffer, 20°C, over a pH range of 5.4 to 8.3. The results showed that the decay constants

were affected by the pH, substrate and species. Since the most pronounced differences in the constants were obtained with lauric aldehyde at pH 6.5-6.7, the latter is recommended for species differentiation by this method. Since all four species can be identified on the basis of the decay constant, the suggestion is made that the constant be regarded as a taxonomic marker. Figures 2; references 12: 4 Russian, 8 Western.

**Determination of Safe Levels of Environmental Factors From Biosystem Response Patterns**

917C0588E Moscow GIGIYENA I SANITARIYA  
in Russian No 2, Feb 91 (manuscript received  
12 Feb 90) pp 90-93

[Article by M. G. Shandala and M. Yu. Antomonov,  
Ukrainian Scientific Hygienic Center, Ukrainian SSR  
Ministry of Health, Kiev]

UDC 614.7-074

[Abstract] Further mathematical arguments are advanced for a previously described method for determining safe levels of environmental factors. In its essential features, an analysis is conducted on the probability of obtaining a particular biological response based adaptive physiological processes in relation to intensity and duration of exposure. The data can then be used for mathematical modeling and extrapolation of safe exposure levels. Practical application of this approach is demonstrated in studies on impact of 55 and 75 dB noise for 2 h on pulse pressure of volunteers. Analysis of the data confirmed that it was possible to differentiate between various stages of physiological response (adaptation, compensation, recovery) and determine safe noise levels. The Ukrainian Ministry of Health has approved this method for setting acceptable exposure standards, in part because of its simplicity and modest

software and hardware requirements for processing. Figures 3; tables 1; references 13: Russian.

**Genotoxic Effects of Pollutants on Plants in Urban Settings**

917C0661A Kiev TSITOLOGIYA I GENETIKA  
in Russian Vol 25 No 1, Jan-Feb 91 (manuscript  
received 21 Aug 89) pp 23-29

[Article by V. S. Pogosyan, Ye. G. Simonyan, E. M. Dzhihardyan and R. M. Arutyunyan, Yerevan State University]

UDC 575.581.15.581.3

[Abstract] Studies in Yerevan showed that grapes and Tradescantia may serve as indicators of atmospheric pollutants. In the northwestern part of the city with a high concentration of industrial chemical plants the frequency of somatic point mutations in Tradescantia was elevated 5.3- to 8.5-fold, while the percentage of sterile Vitis vinifera var. Mskhali pollen was increased 2.2- to 3.2-fold. Exposure to pollutants emitted by vehicular traffic resulted in a 4.8- to 6.5-fold increase in somatic point mutations in Tradescantia in comparison with baseline frequency, while sterility of Araratu grape pollen was increased 1.3- to 3.0-fold. Figures 3; tables 3; references 8: 4 Russian, 4 Western.

### AIDS Data Base

917C0601B Kiev *RABOCHAYA GAZETA* in Russian 9 Aug 91 p 2

[Article by V. Kreshchuk: "The Computer Calculates." First paragraph is *RABOCHAYA GAZETA* introduction in boldface.]

[Text] Our citizens are still of the opinion that computers are not for us, and that the current generation can do quite well without them. However, colleagues at the Laboratory of AIDS Immunology and Immunodiagnostics at the Odessa Military Hospital, which is directed by V. V. Kostyushev, candidate of Medical Sciences, are of a different opinion.

In order to successfully process a large amount of information on complex diseases, a problem-oriented automated complex was developed here that reduces the processing of a list of indices for each patient from eight to nine hours to seven to 10 minutes.

"A comprehensive branched system of clinics for immunological research and immunodiagnostics can and should be developed based on our complex," says Kostyushev. "We must not forget that after the tragedy at Chernobyl zones of extremely dangerous immunodeficiency developed as a result of radiation exposure, and these zones were particularly at risk for AIDS. After all, a person with a depressed immune system is easy prey for any disease. Mass immunological certification of the public is imminent. Our complex makes it possible to clearly and effectively train specialists in controlling AIDS. I believe that our complex and our documentation will be of great interest to employees of health departments, blood transfusion stations, hospitals, medical schools, and scientific research institutes. This innovation needs to be more actively included in controlling this extremely dangerous disease."

### AIDS Deaths Among Children

917C0602A Moscow *MEGAPOLIS-CONTINENT* in Russian No 30, 7-13 Aug 91 p 3

[Article by O. Tarchevskaya: "The Children Keep Dying"]

[Text] The last AIDS victim in Moscow died in July. The little girl was not yet two years old...

Elista, the capital of Kalmyk ASSR, sadly became known worldwide literally overnight. The first large-scale infection of children with AIDS occurred here. Soon similar tragedies were repeated in Rostov Oblast and Volgograd. Throughout Russia the "plague of the 20th century" has infected 265 children, 20 of whom have already died. These tragedies can be grouped together: all the children were infected with AIDS in hospitals.

Criminal proceedings began two years ago based on these facts, but there has been no result, and we still do not know whether anyone will stand trial. This is what Ye.

Myslovskiy, senior examining magistrate for urgent affairs for the RSFSR Chief Public Prosecutor said:

"We cannot say for sure where the first patient appeared. We only know that it all started long before 1988. The children who were infected with HIV (AIDS) during treatment can be found throughout Russia—in Astrakhan, Stavropol, and even Kamchatka. I can't even dare say we have found all the infected children."

Today tests for AIDS are performed everywhere, but it was not so in 1988. In addition, medical personnel are conducting the search for those infected using extremely secret methods; after all, the entire public has been infected with "AIDS-phobia". People infected with AIDS experience terrible moral persecution. The children are expelled from nurseries and schools, and their parents are fired. Local citizens in Volgograd even ransacked the HIV center.

**What is it that prevents you from keeping the medical secret?**

Here's a simple example. A family with a child who has AIDS needs its own apartment. However, in order to get it, the family needs to present the rayon council with a certified copy on the child's illness. Generally, after these councils meet the family's tragedy ceases to be a secret.

**Is it possible to find the actual culprits of the mass infections of the children?**

Children were given injections without changing syringes, and other medical instruments were used repeatedly without proper cleaning. The injections were given by different nurses, so it is hard to determine which one resulted in the infection.

In article 172 UK of the RSFSR it states that official functionaries are responsible for negligent performance of their service duties, but nurses and private physicians are not official functionaries. And legislators do not yet plan to make any changes on this account.

Moreover, I did not find any unequivocal ban against the repeated use of syringes and other medical instruments in orders either from the USSR or Russian Ministry of Public Health. They only attached importance to changing needles, while experiments have demonstrated that this in no way is a guarantee against infection.

**This means that new outbreaks of AIDS are still possible?**

I would not rule it out.



**Experimental Investigation of Effect of Various Biologically Active Substances on Susceptibility of Mosquitos to Malaria Agent. Communication 1. Insect Developmental Regulators**

917C640A Moscow MEDITSINSKAYA  
PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI  
in Russian No 1, Jan-Feb 91 (manuscript received  
7 May 90) pp 3-6

[Article by L. A. Ganushkina, N. F. Zakharova, L. M. Chunina, V. Ya. Yakubovich, and N. R. Dadasheva, Medical Parasitology and Tropical Medicine Institute imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow]

UDC 576.895.771:[591.67:576.893.192.6].042:614.7

[Abstract] The effects of two preparations, dimilin and juvemon, the latter being an analog of juvenile hormone, were experimentally investigated on two models, *Anopheles stephensi*—*Plasmodium berghei* and *Aedes aegypti*—*P. gallinaceum*, using larvae in stage III from both species of mosquitoes. No differences in the effects of the preparations were noted when used on donors with various levels of parasitemia. In using the *Ae. aegypti*-*P. gallinaceum* model, the authors found that dimilin, a chitin synthesis inhibitor in animals, had virtually no effect on the susceptibility of females to the malaria agent. Juvemon was demonstrated to cause death in less than 35 percent of the insects and only slightly decrease the sporozoite index (7-17 percent) when used in low concentrations. However, when used in higher concentrations, juvemon tended to slightly increase the infection rate among surviving females. In conclusion, the data demonstrate that none of the substances in question inhibits the development of malaria plasmodia in their carriers. Figures 1; tables 1; references 18: 7 Russian, 11 Western.

**Experimental Investigation of Effect of Various Biologically Active Substances on Susceptibility of Mosquitos to Malaria Agent. Communication 2. Herbicides and Fungicides**

917C640B Moscow MEDITSINSKAYA  
PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI  
in Russian No 1, Jan-Feb 91 (manuscript received  
7 May 90) pp 6-8

[Article by V. Ya. Yakubovich, N. F. Zakharova, L. M. Chunina, and L. A. Ganushkina, Medical Parasitology and Tropical Medicine Institute imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow]

UDC 576.895.771:[591.67:576.893.192.6].042:  
614.7:615.285.7

[Abstract] Results of previous studies indicate that fungicides (2,4-D amine salt, basagran, propanide, ordram) and herbicides (fundazol, copper sulfate) entering the

mosquito larvae habitat play a certain role in the function of the larvae's aqueous biocenoses and microbiocenoses, which may affect the viability of the emergent females and their ability to transmit the malaria agent. The experiments were performed on larvae in stages I and III of development and the imago of *Aedes aegypti*. The results demonstrated that in spite of significant mosquito deaths and a decrease in the attacking activity of the emergent imagoes, the infection rate among surviving females virtually did not differ between the experimental and control groups. Moreover, no correlation was found between the period during which the larvae were exposed to the pesticide, donor parasitemia, or the infection rate among females. In addition, the data also showed that treating the *Ae. aegypti* larvae with herbicides and fungicides in concentrations that significantly decrease the mosquito population does not persistently or substantially alter the susceptibility of surviving females to *Plasmodium gallinaceum*. In conclusion, the authors found that the emergent females exposed to herbicides have a shorter life span, exhibit diminished attacking activity on prey, and have a higher rate of infection with the malarial plasmodia. In contrast, fungicide treatment had virtually no effect on viability or the female's reaction to prey. Tables 2; references 15: 14 Russian, 1 Western.

**Sensitivity of *Plasmodium berghei* Strain Resistant to Artemisinin and Other Antimalarial Preparations**

917C0640C Moscow MEDITSINSKAYA  
PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI  
in Russian No 1, Jan-Feb 91 (manuscript received  
3 Jan 90) pp 47-50

[Article by O. V. Fedorova, Medical Parasitology and Tropical Medicine Institute imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow]

UDC 615.283.926.015.4:576.893.192.6

[Abstract] The objective of this study was to determine the rate at which *Plasmodium berghei* develops resistance and to determine the degree of sensitivity of a strain resistant to artemisinin with respect to chloroquine, mefloquine, fansidar, quinine, and dabequine. Albino mongrel mice (16-21 g) were infected with *P. berghei* strain NArRs resistant to artemisinin by means of an injection into the abdomen with diluted infected donor blood. Artemisinin was administered once total or once per day for five consecutive days through a probe in the stomach or intramuscularly into the posterior paw muscle in doses ranging from 1 mg/kg to 800 mg/kg. The data indicated that cryopreservation elevated the degree of plasmodium resistance to artemisinin. While some of the other antimalarial preparations exhibited a certain degree of effectiveness against *P. berghei*, fansidar was the only preparation shown to be highly effective against the NArRs strain. In conclusion, the data suggest that the development of artemisinin resistance in the *P. berghei*

strain proceeds slowly. These results also show promise for the use of combined fansidar-type preparations for overcoming artemisinin resistance in *P. falciparum*. Figures 2; tables 2; references 7: 5 Russian, 2 Western.

# **Malaria Imports Into Rostov-na-Donu (1981-1989)**

917C0641A Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 1, Jan-Feb 91 (manuscript received 20 Apr 90) pp 39-41

[Article by A. A. Artamonova and V. D. Khliyan, Scientific Production Association "Rostepidkompleks", RSFSR Ministry of Health, Rostov-na-Donu]

UDC 616.936-036.22(470.61-25)

[Text] The expansion of economic and cultural relations between the USSR and developing countries increased the possibility of importing malaria and the outbreak of local cases of malaria [2-6].

Only imported cases of malaria were noted in Rostov-na-Donu from 1957 through 1981. In 1981 the first local case of four-day malaria, a remote relapse after 35 years, was recorded, and in 1982 a case of three-day malaria was recorded in a six-month-old child, who had been infected from his mother during birth [1].

We analyzed the morbidity rate of malaria in Rostov-na-Donu for the years 1981-1989 with the objective of evaluating imported cases of malaria as a source of infection, and consequently, the degree of risk for renewing the epidemic process. During this period we counted 113 malaria victims, both Soviet and foreign citizens, of which 64 cases occurred between 1986 and 1989.

Data on the species composition of the malaria etiological agent are presented in the table, from which we see that *P. falciparum* was found more often than the other species, in 51 (45.1 percent) cases. The percentage of cases caused by other species of parasites is as follows: 42.4, *P. vivax*, 9.7, *P. ovale*, 2.8, *P. malariae*.

**Distribution of Malaria Cases in Rostov-na-Donu by year, contingent of patients, and species of malaria parasites (1981-1989)**

Year	Contingent of patients	Number of victims	Number by species of malaria etiological agent			
			<i>P. vivax</i>	<i>P. malariae</i>	<i>P. ovale</i>	<i>P. falciparum</i>
1981	Soviet citizens	3	-	1*	-	2
	Foreigners	1	-	-	-	1
1982	Soviet citizens	1	1*	-	-	-
	Foreigners	3	3	-	-	-
1983	Soviet citizens	7	5	-	1	1
	Foreigners	9	1	-	-	8
1984	Soviet citizens	1	-	-	-	1
	Foreigners	8	5	-	1	2
1985	Soviet citizens	7	7	-	-	-
	Foreigners	3	2	-	-	1
1986	Soviet citizens	10	6+4*	-	-	-
	Foreigners	10	2	1	2	5
1987	Soviet citizens	5	2+2*	-	-	1
	Foreigners	10	2	1	1	6
1988	Soviet citizens	1	1	-	-	-
	Foreigners	14	3	-	2	9
1989	Soviet citizens	2	1	-	-	1
	F	18	1	-	4	13
	Total	113	41+7*	2+1*	11	51

\* - Local cases

In investigating the geographical structure of the importation of malaria prior to 1986, we noted that 58.2 percent of malaria victims arriving from countries in Asia, both Soviet and foreign citizens, were infected with *P. vivax*. Tropical malaria was the dominant species in individuals arriving from countries in tropical Africa.

In analyzing the importation of malaria using various contingents of patients, we found that for 1981-1985 19 cases of malaria occurred in Soviet citizens, and 24 were found in foreign citizens, while for 1986-1989, these figures were 11 and 52, respectively. We believe that victims arriving with three-day malaria present the

greatest risk with respect to possible epidemiological as well and clinical sequelae of importing the disease. Most of the cases of malaria in foreign students were found during regular examination upon arrival at Rostov-na-Donu (September-October), when the probability of infection from mosquitoes falls drastically.

An analysis of the monthly distribution of cases of malaria among Soviet citizens demonstrated that 20 of the 30 detected were recorded during the season of malaria transmission and could be a source of infection, since diagnosis in 61.5 percent of cases was made within three to ten days of the beginning of illness. Late diagnosis of the malaria infections that occurred in later years may be explained by the fact that their clinical pattern was often obliterated with the use of anti-malaria preparations with the purpose of its prevention in places of possible infection, with the use of other therapeutic preparations, as well as with the lack of proper caution on the part of the physicians in charge.

The drastic increase in the importation of three-day malaria in 1985-1986 resulted in the occurrence of four local cases of three-day malaria in 1986.

*P. vivax* is a species which in the past was the most widespread in Rostov Oblast, where conditions were favorable for its transmission, since Rostov-na-Donu is located on a flood plain in a steppe (which is at greatest risk for renewing transmission of the infection), where the mass breeding of the malaria mosquitoes occurs and where up to 70 percent of all cases of imported malaria are recorded.

According to data from M. A. Shumkov and L. Ya. Ilchenko [7, 8], there are two species of malaria mosquitoes in Rostov-na-Donu: *An. messeae*, which comprises 98 percent of the entire population of malaria mosquitoes, and *An. atroparvus*, which comprises 2 percent. The population of malaria mosquitoes outside the treatment zone is very high, since, for example, in July and August there is an average of 2,452 specimens per day. In the treatment zone the population reaches 20-30 specimens per day. Rostov-na-Donu is a territory at high risk for the spread of malaria. The length of the period with a temperature above 16°C in the southern rayons lasts up to 145 days. There are five to six generations of mosquitoes born annually. The flood plain reservoirs on the left shore of the Don River, purification installations, fishing ponds, the Temernik Rivers, and ponds in the village of Ordzhonikidze are the breeding sites. The anophelogenous area in different months of the year ranges from 50 to 300 hectares.

There are a number of factors contributing to the occurrence of local cases of malaria. These factors include the increase in the importation of three-day malaria and the significant activation of migrational processes. Local cases of malaria occurred as a result of incomplete and slow performance of a group of prophylactic measures in potential foci because of the lack of training in municipal sanitation service personnel and inadequate level of

training in physicians in the general hospital network and in physician-laboratory technicians, which in a number of cases resulted in late diagnosis of malaria. The volume of measures performed for observation and control of the malaria mosquitoes also dropped in the city because of insufficient entomological personnel.

The resultant situation needed the most rigid execution of all measures of epidemiological monitoring with the objective of prompt identification and effective treatment of malaria victims and performance of effective anti-mosquito measures.

Specialists from the oblast sanitation and epidemiology station, the municipal sanitation and epidemiology station, and the "Rostepidkompleks" Scientific Production Association developed an operative plan of measures for eliminating malaria outbreaks in Rostov-na-Donu for 1987-1989 and additional measures for controlling the malaria mosquitoes with the use of a complex of hydro-technical studies and a previously developed plan of measures for combatting the mosquitoes and other hazardous insects in Rostov-na-Donu for 1986-1990. A letter on "Tactics for the Parasitologist (Epidemiologist) and Entomologist in Malaria Outbreaks in Territories Where Transmission of the Etiological Agent Has Returned" was prepared.

The municipal entomologists evaluated the anophelogenous reservoirs in the city and within a 3-5 km radius around the city.

The performance of the complex of anti-malaria measures resulted in the recording of only two local cases of malaria (one relapse, another with prolonged incubation) during the malaria transmission season (in March) in 1987. In subsequent years there were no cases of local malaria in Rostov-na-Donu.

Since 1980, weekly seminars on the laboratory diagnosis of malaria have been held annually in Rostov-na-Donu for the physician-laboratory technicians before the epidemiological season (March, April). Along the lines of health education work the Health Education Office publishes reminders on malaria prevention for the public once every two years.

In order to prevent the clinical and epidemiological sequelae of the importation of malaria, it is necessary to examine all individuals arriving from areas endemic for malaria during the epidemic season and all exhibiting signs of the disease and give them anti-relapse treatment. We need to combat the malaria carriers with ecologically safe methods that prevent the development of resistance and do not pollute the environment. Continuing systematic work on training of specialized personnel (parasitologists, entomologists, and their assistants and laboratory

technicians) as well as medical personnel in the general medical network in the field of malariology is of utmost importance.

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### Identification of Chromosome Aberrations Which Reflect Instability of Genome of Descendants of Irradiated Cells

917C0579B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 316 No 5, Feb 91 pp 1239-1244

[Article by A. A. Zhloba, A. V. Sevankayev; Scientific Research Institute of Medical Radiology; USSR Academy of Medical Sciences; Obninsk; Kaluga Oblast]

UDC 612.014.482.4:576.312.36

[Abstract] Previous study of regularities of reproduction of chromosome aberrations with the use of a methodical procedure which indicated homologous segments of chromosomes having a common source of origin showed that, along with normally duplicating chromosome fragments, which, during reproduction, give duplicated twin fragments, appear some unusual fragments which are scattered in palindromic structures. This article described a study of the frequency of these palindromic structures in the second post-radiation mitosis and regularities of their subsequent reproduction. The study showed that they appeared with high frequency which increased with the increase of periods of fixation but in the reproduction period in the third post-radiation mitosis the fragments form only duplicated twin structures. Free (unduplicated) palindromic fragments did not appear in the third post-radiation mitosis. This justified the assumption that, in mitosis, distinct distribution of chromatids from twin fragments in daughter cells did not occur; both of these chromatids were eliminated or passed into one of the daughter cells in the twin. The source of origin of free fragments in the second post-radiation mitosis appeared to be their formation de novo. These data provided a basis for proposing a test-system for assessing a radiation-induced unstable genome. Use of this test-system in analysis of quantitative regularities of reproduction of the palindromic fragments revealed the percentage of chromosome fragments connected with radiation-induced prolonged mutagenesis. Figures 3; references 10: 5 Russian, 5 Western.

### Expression of Glowworm Luciferase Gene in Mammalian Cells Using Vaccinia Virus Vectors

917C0639A Moscow MOLEKULYARNAYA GENETIKA, MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian No 2, Feb 91 (manuscript received 23 Jan 90) pp 23-28

[Article by V. I. Krauzova, T. N. Kopylova-Sviridova, T. M. Timiryasova, and I. I. Fodor, Biochemistry and Physiology of Microorganisms Institute, USSR Academy of Sciences, Pushchino, Moscow Oblast]

UDC 578.821.51:578.56].083.2

[Abstract] The glowworm luciferase gene was employed for preliminary evaluation of plasmids being constructed in a transient expression system for the quantitative description of the expression of this gene as compared to the expression of another reporter gene, bacterial  $\beta$ -galactosidase, under the control of various virus promoters and for the production of stable recombinant clones that express luciferase. Transient expression of the luciferase gene was used to select the optimal conditions for expression and evaluation of the effectiveness of expression, depending on the plasmid construction and the promoters that control the luciferase gene. The results demonstrated that both vaccinia virus vectors P7.5 and P11 promote the highly effective expression of luciferase. In addition, the authors demonstrated that the luciferase reporter gene can be used for preliminary monitoring of plasmids before they are used in the production of stable recombinant virus clones that express the foreign gene. Blot hybridization with a [ $^{32}$ P]-DNA probe demonstrated that the luciferase gene had been inserted into the vaccinia virus vector genome. Results of this study also demonstrated that the luciferase gene could be used as a reporter for investigating the replication and dissemination of the virus in the cell culture. In conclusion, the data suggest that the glowworm luciferase reporter gene can be employed for transient gene expression, monitoring of vaccinia virus vector promoters, and production of stable recombinant vaccinia virus vectors that bear the luciferase gene in their genome. Figures 4; tables 4; references 16: 4 Russian, 12 Western.



**Radioreceptor Studies on Thymic Opioid Ligands**

917C0365A Moscow IMMUNOLOGIYA in Russian No 6, Nov-Dec 90 (manuscript received 24 Jan 89) pp 14-16

[Article by S. F. Pshenechkin, All-Union Scientific Center for Mental Health, USSR Academy of Medical Sciences, Moscow]

UDC 612.438.014.467:[547.943:547.95].08

[Abstract] Ligand binding studies on rats, calves, mice and seals led to the demonstration that thymocytes possess receptors for endogenous opioids. Centrifugation in perkoll density gradients showed that two thymocyte fractions with buoyant densities of 1.079/1.085 and 1.05/1.090 accounted for approximately 90 percent of Igm-type and virtually 100 percent of Igd-type receptors in the thymus. These fractions have been shown to consist largely of small cortical cells. In addition, acetic acid extracts of thymus, thymosin (fraction 5) and T-actemodulin were shown to contain 10 kD opioids binding to  $\mu$  and  $\delta$  receptors in competitive binding assays. Fractionation on HW-50F columns led to isolation of ligands binding specifically to the  $\mu$  receptors. These observations provide further support for the role of endogenous opioids in regulation of the immune response. Figures 2; tables 2; references 15: 4 Russian, 11 Western.

**Immunotropic Activity of Novel Drug Kemantane**

917C0365B Moscow IMMUNOLOGIYA in Russian No 6, Nov-Dec 90 (manuscript received 30 Oct 89) pp 21-23

[Article by N. G. Artsimovich, T. A. Fadeyeva, T. S. Galushina, N. V. Klimova, B. M. Pyatin and O. M. Krasnova, Institute of Immunology, USSR Ministry of Health; Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

UDC 615.275.4.015.46:612.017.1.063

[Abstract] Multifaceted studies were conducted on several inbred strains of mice to assess the immunotropic potential of a kemantane (1-oxyadamantane-4-OH), a novel derivative of adamantane. The results showed that i.p. administration of kemantane (50-200 mg/kg/day; three times, one day apart) resulted in significant elevation of IgM response to SRBC. Administration after immunization was ineffective. Administration of kemantane after immunization was effective in enhancing generation of IgM antibodies in cyclophosphane-suppressed mice. Kemantane was also demonstrated to be efficacious in enhancing stem cell migration from bone marrow to spleen, enhancing cytotoxic activity of lymphocytes against fibroblasts, and in attenuating activity of splenic T-suppressors. In in vitro studies with 0.25-10  $\mu$ g/ml kemantane was found to intensify ConA-induced lymphocyte blast transformation, with a maximum effect obtained with 2.5  $\mu$ g/ml of kemantane. Figures 2; tables 3; references 12: 8 Russian, 4 Western.

**Immunotropic Properties of Phenazepam**

917C0627C Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 54 No 2, Mar-Apr 91 (manuscript received 22 Feb 90) pp 59-61

[Article by P. F. Zabrodskiy, Chair of Toxicology, Saratov Medical Institute]

UDC 615.214.22.015.46:612.017

[Abstract] In view of the demonstration that benzodiazepines affect the immune system, phenazepam was assessed for its immunotropic actions. Studies on 180-220 g male Wistar rats and 16-18 g male CBA mice showed that intramuscular phenazepam in a dose of 1-5 mg/kg enhanced the antibody response to sheep erythrocytes, representing thymus-dependent antigens. In analogous studies 2.5 mg/kg of phenazepam led to an increase in the antibody response to the thymus-independent Salmonella typhi Vi antigen. In addition, phenazepam (2.5 mg/kg) also induced a 2.1-fold increase in antibody-dependent cellular cytotoxicity in mice and enhanced macrophage-based induction of antibody formation eight days after their transfer to syngeneic recipients. Finally, administration of phenazepam (2.5 mg/kg) 30 min after armin (LD<sub>50</sub>) overcome the immunosuppressive effects of the latter. The putative mechanisms of action underlying the immunotropic effects of phenazepam may involve M-cholinomimetic properties of phenazepam as well as its action on monooxygenase metabolism and benzodiazepine receptors on immunocompetent cells. Figures 1; tables 2; references 9: 6 Russian, 3 Western.

**Induction of Immune Response by Synthetic Fragments of VPI Protein of Foot-and-Mouth-Disease (FMD) Virus Covalently Bound to Polymeric Carrier**

917C0365D Moscow IMMUNOLOGIYA in Russian No 6, Nov-Dec 90 (manuscript received 28 Nov 89) pp 37-39

[Article by E. R. Eyvazova, Sh. Kh. Khalikov, A. V. Nekrasova, V. N. Borisova, M. I. Ismailov and A. N. Shakhmatov, Institute of Immunology, USSR Ministry of Health, Moscow]

UDC 616.98:578.835.2]-078.33

[Abstract] Synthetic peptide fragments representing sequences 143-148, 153-159, 149-159 and 146-159 of VPI protein of FMD virus A<sub>12</sub>119 were conjugated to acrylic acid-N-vinylpyrrolidone copolymer carrier for testing as synthetic immunogens. Trials on (CBA x C57Bl)F<sub>1</sub> mice showed that i.p. immunization resulted in the production of specific antibodies and/or priming for a secondary antibody response, depending on the dose. The peptides were found to be equally effective as immunogens; the results suggest that it may be possible to construct a synthetic vaccine against the FMD virus. Figures 2; references 15: 2 Russian, 13 Western.

**Biological Activity of Recombinant Human Interleukin 1B (IL-1B): Lymphocyte Activation**

917C0365E Moscow IMMUNOLOGIYA in Russian  
No 6, Nov-Dec 90 (manuscript received 10 May 90)  
pp 39-42

[Article by A. S. Simbirtsev, N. V. Pigareva, S. A. Ketlinskiy, N. M. Kalinina, Yu. P. Vinetskiy, S. V. Kotenko, S. V. Mashko and L. S. Izotova, All-Union Scientific Research Institutes of Highly Purified Biopreparations, Leningrad, and of Genetics, Moscow]

UDC 612.112.94.015.2:612.6].08

[Abstract] Extensive studies were conducted to determine the lymphocyte activation potential of Soviet recombinant human IL-1 $\beta$  [Kotenko, SV, et al., Dokl. AN SSSR, 309 (4): 1005, 1989]. Recombinant IL-1 $\beta$  was found to be equivalent to natural IL-1 $\beta$  and IL-1 $\alpha$  in its effects on human and mouse T and B cells. Recombinant IL-1 $\beta$  was shown to stimulate mouse thymocytes, splenocytes and peripheral blood lymphocytes in a dose-dependent manner. IL-1 $\beta$  was also shown to induce proliferation of human B cell lines transformed by Epstein-Barr virus and enhance expression of IL-2 receptors on human peripheral blood mononuclear cells. Additional studies demonstrated that IL-1 $\beta$  induced synthesis of IL-2 by mitogen pretreated murine splenocyte EL-4 cell line. Figures 3; tables 3; references 12: 2 Russian, 10 Western.

**Immune Status of Children With Alopecia**

917C0365F Moscow IMMUNOLOGIYA in Russian  
No 6, Nov-Dec 90 (manuscript received 12 Jan 90)  
pp 51-53

[Article by A. V. Karaulov, B. V. Pinegin, O. F. Yermolina, A. V. Simonova, K. Ye. Balashov, N. M. Golubeva, A. V. Kulakov and L. V. Luss, Institute of Immunology, USSR Ministry of Health, Moscow]

UDC 616.594.14-053.2-092:612.017.1]-07

[Abstract] Fifty two- to nine-year-old children with diffuse or total alopecia were subjected to immune assessment in view of the contradictory information available on the immune status of this category of patients. The patients presented with a general elevation of lymphocyte counts, but concomitantly reduced counts of CD2<sup>+</sup> T cells and T helper (CD4<sup>+</sup>) subsets. In addition, lymphocyte blast transformation in response to mitogen stimulation was generally attenuated. Neutrophil function was also abnormal in most patients. In 20.1 percent of the patients the phagocytic index was elevated although most failed to show a metabolic burst in NBT tests. Immunoglobulin determinations showed markedly elevated IgG and IgE levels, the latter indicating an active allergic process. In addition, B cells (CD21<sup>+</sup>) were depressed despite raised IgG levels in most cases. Tables 3; references 7: 4 Russian, 3 Western.

**Dalargin Modulation of Stress-Induced Changes in Humoral Immunity**

917C0365G Moscow IMMUNOLOGIYA in Russian  
No 6, Nov-Dec 90 (manuscript received 31 Jan 90)  
pp 76-77

[Article by M. R. Shchurin, S. F. Pshenichkin and A. A. Zozulya, All-Union Scientific Center for Mental Health, USSR Academy of Sciences, Moscow]

UDC 615.31:1[547.95:547.943].015.46.07

[Abstract] Male (CBA x C57BL/6)F<sub>1</sub> mice, 20-22 g, were subjected to various forms of stress in order to assess the immunomodulating effects of dalargin, a synthetic analog of leu-enkephalin. Forced swimming in warm (38°C) or cold (4°C) water, exposure to heat (39°C) or cold (4°C) for various periods of time, and various forms of electric stimulation (5-10 mV; 5 sec to 70 min) of the extremities had variable effects on antibody formation against SRBC, depending on intensity and duration of the stress factors. However, pretreatment of animals with dalargin (20  $\mu$ g/kg; i.p.) was shown to abrogate the immunosuppressive effects of cold and the immunostimulation by electric current application. The immunomodulating effects of dalargin were eliminated by administration of 100  $\mu$ g/kg of naloxone 20 min before dalargin injection. These findings demonstrated that synthetic opioid agonists interacting with  $\delta$ -type receptors may be used to modulate humoral immunity, both to mitigate the effects of stress and, possibly, in correcting clinical conditions. Furthermore, stimulation of endogenous opioids may have a similar effect. Figures 1; tables 1; references 15: 8 Russian, 7 Western.

**Monoclonal IgG Antibodies Against Shigella Flexneri VI LPS**

917C0365H Moscow IMMUNOLOGIYA in Russian  
No 6, Nov-Dec 90 (manuscript received 9 Feb 90)  
pp 78-80

[Article by G. P. Yermakov and V. G. Nesterenko, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

UDC 616.98:579.842.15]-07:616.153.962.4-097-078.33

[Abstract] Conventional methodology for the generation of monoclonal antibodies (MA) was employed for securing antibodies against the O antigen of Sh. flexneri VI, commencing with immunization of BALB/c mice with LPS. Screening of the resultant clones by ELISA and PHA techniques resulted in the identification of 15 clones producing MAs belonging to various IgG subclasses. Detailed analysis of seven of the clones demonstrated that in six cases the MAs were specific for 'carboxyl'-type epitopes on the O antigen, and in one case against an epitope that was neither of the 'carboxyl' nor 'acetyl' type. Tables 3; references 9: 3 Russian, 6 Western.

**Hygienic Assessment of Natural Substance Inhalants**

917C0588A Moscow GIGIYENA I SANITARIYA  
in Russian No 2, Feb 91 (manuscript received  
6 Mar 89) pp 12-14

[Article by M. T. Dmitriyev, M. P. Zakharchneko and E. V. Stepanov, Scientific Research Institute of General and Communal Hygiene imeni N. A. Semashko, USSR Academy of Medical Sciences, Moscow]

UDC 615.214.31:547.9].032.23.015.4:612.017.1].076.9

[Abstract] A 'forest air' inhalant was tested on 170-220 g Wistar rats to assess the impact on immunity, since the agent is recommended as a general tonic. The animals were exposed to the inhalant for 30 days, which consists of 1 mg/m<sup>3</sup>, which consists of 33.5 percent  $\alpha$ -pinene, 20.9 percent camphene, 13 percent  $\beta$ -pinene, 6.96 percent tricycline, 4.87 percent santene, 2.35 percent  $\beta$ -phellandrene, 1.29 percent limonene, 1.04 percent bornyl acetate, 0.263 percent cymnol, 0.102 percent myrcene, 0.099 percent terpinolene, 0.062 percent  $\alpha$ -phellandrene and 0.05 percent camphor. Immune monitoring of the rats showed that certain immunologic parameters were elevated and that the changes persisted for at least five days post-exposure. These included enhanced phagocytosis, concentration of cationic proteins in granulocytes, T and B lymphocyte counts and neutrophil function. Other parameters, such as immunoglobulin levels, were not affected. Tables 2; references 5: Western.

**Environmental Health Risk Posed by Castor Oil Processing Plant**

917C0588C Moscow GIGIYENA I SANITARIYA  
in Russian No 2, Feb 91 (manuscript received  
29 Dec 89) pp 71

[Article by M. A. Mironenko, O. A. Adamov, A. I. Maykovskiy, N. I. Ponomarenko and B. Ye. Urman, Saratov Scientific Research Institute of Rural Hygiene; Belorechensk Rayon Sanitary Epidemiologic Station; Belorechensk Center Rayon Hospital]

UDC 614.2:631.145]-07

[Abstract] An epidemiologic survey was conducted among the workers of the Belorechensk Oil Extraction Plant to determine the incidence of allergy related to castor oil allergens, as well as the impact of the plant on community health. Monitoring of 214 workers revealed that 18.5 percent were allergic to specific castor allergens. In addition, 10-12.5 percent of individuals residing within 1500-2000 m of the plants also tested positive. To a large extent the incidence of allergenicity was attributed to poor control of air quality at the plant, with residents in the vicinity often complaining of unpleasant odors. The findings pointed to the need for improved effluent treatment at the plant and prohibition of residential dwellings within a 2 km zone of the plant as initial steps in alleviation of the health risk posed by the plant. References 6: 3 Russian, 3 Western.

**Gas Chromatographic Determination of Phenol in Urine**

917C0588D Moscow GIGIYENA I SANITARIYA  
in Russian No 2, Feb 91 (manuscript received  
12 Sep 89) pp 85-86

[Article by M. T. Dmitriyev and Yu. B. Suvorova, Central Scientific Research Institute of General and Communal Hygiene imeni A. N. Semashko, USSR Academy of Medical Sciences, Moscow]

UDC 616.634.95:547.56]-074:543.544

[Abstract] A gas chromatographic method was developed for phenol determination in urine samples, relying on a Khrom-4 chromatograph fitted with a flame-ionization detector. The method involved hydrolysis of phenyl sulfates and glucuronids by concentrated hydrochloric acid and analysis of the vapor phase for phenol on an NAW column. The sensitivity of the method was on the order of 3  $\mu$ g/ml of phenol with an error of 19 percent at  $p = 0.95$ . Baseline human levels are 7-8  $\mu$ g/ml of phenol, with animal levels ranging from 16 to 20  $\mu$ g/ml. Figures 2; references 5: 3 Russian, 2 Western.

**Immunological and Physicochemical Effects of Lasers on Biological Targets**

917C0365C Moscow IMMUNOLOGIYA in Russian  
No 6, Nov-Dec 90 (manuscript received 30 Nov 89)  
pp 30-32

[Article by V. N. Shabalín, T. V. Ivanenko, T. V. Sokoiova and A. Ya. Olshanskiy, Moscow Order of Red Banner of Labor Clinical Scientific Research Institute imeni M. F. Vladimírskiy]

UDC 615.849.19.015.46.07

[Abstract] The expanding use of laser therapy has led to an assessment of the effects of a low intensity helium-neon laser (632.8 nm wavelength; 10 mW/cm<sup>2</sup> intensity) on white cells derived from 35 healthy donors, 18 to 50 years old. In vitro studies with 3 and 6 J/cm<sup>2</sup> doses showed that laser exposure led to an increase in expression of SRBC receptors on T cells, stimulated oxygen-dependent phagocytic mechanisms of neutrophils as determined in nitroblue tetrazolium tests, and promoted an increase in intracellular pH. The effects were dose-dependent and demonstrated that some beneficial effects of helium-neon laser therapy may be attributed to action on immunocompetent cells. Tables 3; references 11: 9 Russian, 2 Western.

**Diode Laser Spectroscopy Analysis of Exhaled Air**

917C0468A Moscow IZVESTIYA AKADEMII NAUK  
SSSR: SERIYA FIZICHESKAYA Vol 54 No 10,  
Aug 90 pp 1909-1914

[Article by A. I. Kuznetsov, A. P. Logachev, and Ye. V. Stepanov, General Physics Institute, USSR Academy of Sciences]

[Abstract] Diode lasers currently are being used to monitor environmental pollution. They are extremely selective and can monitor several different gases with the same spectral range simultaneously. This paper presents the first results of using diode laser spectroscopy to analyze the carbon monoxide concentration in air exhaled by a smoker and by a trained athlete. The air exhaled by the smoker was shown to have a baseline concentration of 20 million<sup>-1</sup>, which is 2-fold greater than the maximum acceptable daily exposure. This figure peaked to 50 million<sup>-1</sup> during smoking. Analysis of the air exhaled by a trained athlete after a five minute run showed no differences when compared with before-run figures or the atmospheric CO concentrations. But 15 min following the run, the CO concentration peaked at 6 million<sup>-1</sup>. There was a second run starting 20 min after the beginning of the experiment. At 50 min, there was a second peak of 10 million<sup>-1</sup>. These results suggest that after physical exercise, when oxygen has been depleted from the tissues, carbon dioxide is not thoroughly cleaved. Carbon monoxide remains and is eliminated from the tissues by hemoglobin. Fields for the future development and expansion of applications for

diode laser spectroscopy include: 1) developing instruments that simultaneously record several gas components in exhaled air; 2) recording different isotopic modifications of molecules, i.e., <sup>12</sup>CO or <sup>13</sup>CO, for use in the diagnosis of diabetes, intestinal, lung, or liver dysfunction, cirrhosis, etc., and 3) developing a system that combines diode lasers with the middle infrared range and light guide fibers. The gas analyzers built on their basis will make it possible to conduct remote analysis by simplifying the equipment and expanding its functional capacity. Figures 4; references 8: 6 Russian, 2 Western.

**Seventh All-Russia Conference of Hygienists and Sanitary Physicians: Main Directions of Conference Work (Rostov-on-the-Don, June 1991)**

917C0545A Moscow ZDRAVOOKHRANENIYE  
ROSSIYSKOY FEDERATSII in Russian No 3, Mar 91  
p 32

[Article by All-Russia Society of Hygienists and Sanitary Physicians]

UDC 613+614:061.3(470)"1991"

[Text] The poor health and ecological situation, serious problems in the area of environmental protection policy and the introduction of modern technology into the national economy, and substantial changes in manufacturing and economic relationships have been noted in various regions of the Russian Federation. These factors make necessary the rapid solution of health problems in the primary prophylaxis of diseases that are related to the negative effects of anthropogenic and natural factors on the body, with the purpose of improving the current health legislation and providing scientific substantiation for government measures to be planned and implemented to improve the health and living conditions for the people in the Russian Republic. The next Seventh All-Russia Conference of Hygienists and Sanitary Physicians will be held to select the means and identify possible solutions to these problems. The conference is addressed to the thorough analysis of the current condition and determination of the outlook for the development of hygiene science and sanitary practice for 1991-1995.

The conference is planning to discuss the following problems: hygienic aspects of improving the ecological sanitary conditions in Russia and the effectiveness of scientific research conducted in this area; the incidence, dynamics, and diagnosis of early signs of occupational diseases and the general morbidity rate of employees in various branches of industry and in various regions; methodical problems of the organization of an occupational pathology service in the RSFSR; legal basis and effectiveness of health inspection performed by the government; improvement of the forms and methods of



sanitary and epidemiology service work, including goal-oriented planning; and personnel support with sanitary-epidemiology stations and scientific research institutes, and training of sanitary physicians and skilled specialists.

The conference will determine the problems of greatest priority in the near future by improving the status of the environment and industrial areas, by improving the health, and by decreasing the morbidity rate of individual age and occupational groups of the population in the administrative territories of the Russian Federation, taking into account the specifics of the sanitary and health situation that is developing in them and the incidence of anthropotechnogenic factors.

The conference is planning to outline measures for fundamental and applied research for solving health problems and provide equipment and financial support for these research projects. It is also planning to develop approaches to accelerating the introduction of their results into public health practice and the national economy in conditions of changing to a market economy.

The final result of the conference will be determination of specific problems and tenets of the concept of hygienists and sanitary physicians on the stabilization of the sanitary and ecological situation in the Russian Republic, the development of conditions for its subsequent improvement based on reducing the risk factors in the habitat and improve the methodology of assessing their danger to man with respect to the aspects of this stage of the socio-economic development of society.  
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#### Side Effects of Intravenous Laser Therapy

917C0573A Moscow SOVETSKAYA MEDITSINA in Russian No 12, Dec 90 (manuscript received 25 Dec 89) pp 52-54

[Article by I. I. Sivkov, V. G. Kukes, T. V. Kozlova, I. A. Steblyukova, V. A. Mitrofanov, and G. I. Shaporova; Departments of Introductory Therapy (Professor I. I. Sivkov, director) and Clinical Pharmacology (Professor V. G. Kukes, director), First Moscow Order of Lenin and Order of the Red Banner of Labor Medical Institute imeni I. M. Sechenov]

UDC 616.127-005.4-085.849.19.032.14-06

[Abstract] The tasks of this work were to study the extent of the therapeutic effect of laser radiation, to identify possible side effects and complications, and to develop methods to correct them. Complex investigations were conducted on treating patients with cardiovascular diseases by intravenous laser therapy. The laser sources were ULF-01 "Yagoda" and "Alok-1" helium-neon optical lasers with a 0.63  $\mu\text{m}$  wavelength and output power at the end of the light pipe of 7-10 and 1-2 mW, respectively. The quartz light pipe was introduced 30-60

min. after injecting a needle into a forearm vein. Side effects and complications of intravenous laser therapy could be divided into the following groups: complications due to relative overdoses of laser radiation (hyperaggregation of thrombocytes and an increase in their functional activity, changes in the hemostasis system such as increased fibrinogen concentration, and vascular spasms), side effects induced by the activity of laser radiation (reduction in the frequency of heart contractions), and complications associated with technical errors in the method (thrombophlebitis in the forearm surface veins caused by splitting the light pipe while removing it from the vein). The obtained data allowed the authors to recommend using laser therapy in clinical practice under conditions of adequate dosage and compliance with safety procedures. The safest and most efficient laser power at the end of the light pipe was found to be 1-2 mW for 30-45 min. with four to five procedures per course of treatment. Figures 2; references 12; Russian.

#### Study of Effect of Laser Radiation on Early Development of Loach

917C0582B Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: BIOLOGIYA in Russian Vol 16 No 1, Jan-Mar 91 pp 34-38

[Article by O. V. Averyanova, A. B. Burlakov, V. Z. Pashchenko et al.]

UDC 591.392:597.554.3

[Abstract] A study of the effect of low-intensity helium-neon laser radiation on early embryogenesis of loach involved exposure of unfertilized loach eggs to helium-neon radiation of 0.1-11.5 mW/cm<sup>2</sup> intensity for 30-360 s. The irradiated eggs and control (not irradiated) eggs were fertilized simultaneously by a mixture of sperm from four to five males and the embryonal development of the loach was assessed. Continuous irradiation of low viability (successful fertilization of less than 30 percent) eggs for 120-240 s with a beam of 7.5-8 mW/cm<sup>2</sup> intensity produced distinct biostimulatory effects. The number of abnormal embryos decreased. Embryogenesis and hatching accelerated and became more synchronous and the prelarvae yield increased two to three times. Laser radiation increased the weight and body length of hatching prelarvae significantly. These results approximated results obtained in other studies of the effect of neon-helium laser irradiation on embryonal development of different vertebrates. References 13; 10 Russian, 3 Western.

#### Nd-YAG Laser Surgery of Complications of Reconstructive Keratoplasty

917C0625A Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 5, 1990 (manuscript received 5 Mar 90) pp 273-276

[Article by A. V. Stepanov, cand. med. sci., Moscow Scientific Research Institute of Eye Diseases imeni Gelmgolts]



UDC 617.713-089.843-06:616-085.849.19

[Abstract] Monitoring of 79 patients with reconstructive keratoplasty revealed complications in 59 patients (74.7 percent) requiring further intervention for which Nd-YAG laser therapy (1.5-3.0 mJ; 5-40 pulses) was elected. The complicating conditions consisted largely of secondary cataracts, anterior and posterior synechiae, vitreocorneal adhesions, pupillary deformations and secondary glaucoma. Evaluation of the clinical outcome of Nd-YAG laser intervention substantiated the use of this modality in secondary cataracts, prevention of adhesions, and in secondary glaucoma. In general, the clinical impression was that Nd-YAG laser therapy can be employed for up to two months after keratoplasty, while peripheral laser iridectomy can be performed at any time. References 15: 7 Russian, 8 Western.

### **Morphologic Correlates of Transconjunctival Scleral Cyclocoagulation in Rabbits by Continuous Krypton Laser**

917C0625B Odessa *OFTALMOLOGICHESKIY ZHURNAL* in Russian No 5, 1990 (manuscript received 6 Mar 89) pp 300-303

[Article by N. N. Aleksandrova, cand. med. sci., P. I. Saprykin, prof., A. D. Semenov, cand. med. sci., and V. V. Rodionov, engineer, Chair of Eye Diseases, Saratov Order of the Red Banner of Labor Medical Institute; MNTK [expansion unknown] of Eye Microsurgery, RSFSR Ministry of Health]

UDC 617.7:616-085.849.19:612.084-091.8

[Abstract] Histologic assessment was conducted to define the sequelae of transscleral krypton laser therapy (Lasertek, Finland; 0.8-3.0 W, 2.0 sec exposure, 1000  $\mu$ m spot diameter) 1.0-1.5 mm from and parallel to the limbus in 3.0-4.0 kg chinchilla rabbits. The extent of destruction of the ciliary epithelium and ciliary processes was shown to be a dose-dependent phenomenon. Low doses (0.8 W) were essentially without histopathologic consequences, while high doses (2.0-3.0 W) led to pronounced and prolonged tissue damage, including hemorrhages in all of the ocular tissues. Dosages in the 1.0-1.5 W range had a minimal effect on the ciliary body and ciliary processes, while effectively sclerosing vascular tissues involved production of intraocular fluid. Figures 4; references 6: 3 Russian, 3 Western.

### **Effect of Laser Radiation on Effectiveness of Antibiotic Therapy in Experimental Pyelonephritis**

917C0629B Tbilisi *SOOBShCHENIYA AKADEMII NAUK GRUZINSKOY SSR* in Russian Vol 140 No 2, Nov 90 (manuscript received 21 Sep 90) pp 409-411

[Article by G. A. Vadachkoria, R. G. Salakaya, N. B. Amiryan, M. O. Gogvadze, M. O. Chkheidze, and O. V. Tsintsadze, Urology and Nephrology Scientific Research Institute imeni A. P. Tsulukidze]

UDC 616.61-002.3-092:615.33.849.19:576.8

[Abstract] Experimental ascending colibacterial pyelonephritis was induced in 15 rabbits (three groups) to assess whether the use of helium-neon laser radiation in conjunction with antibiotic therapy increases the effectiveness of the latter. The first group was administered gentamicin and ampicillin every 12 hours for 10 days. The second group was treated with intravascular radiation by means of a light guide for 40 minutes at a density of 50-100 mV/cm<sup>2</sup>, three times at three day intervals. The third group was administered antibiotics and irradiated in the above-listed manner. The results demonstrated that the combined therapies satisfactorily eliminated leukocyturia and bacteriuria from the urine and renal tissue in the third group, but not in the first or second groups. In addition, all facets of neutrophil phagocytosis in the animals normalized after the combined therapies and the absorptive function and digestive ability of the neutrophils returned to normal. In conclusion, the data indicate that the use of the helium-neon laser enhanced the effectiveness of antibiotic therapy by eliminating bacteria faster from the kidneys and preventing significant macro- and microscopic damage. References 3: Russian.

### **Use of Laser Radiation to Treat Disseminated Sclerosis**

917C0634A Riga *IZVESTIYA LATVIYSKOY AKADEMII NAUK* in Russian No 3, Mar 91 pp 120-123

[Article by G. I. Eninya, M. Ya. Metra and V. A. Chernyakov, Latvian Medical Academy]

[Abstract] A method has been developed and tested for treatment of disseminated sclerosis using the radiation of a helium-neon laser. An optical fiber attachment 2.5-3 m in length, with a fiber diameter of 400-600  $\mu$ m. At the distal end of the monofilament optical fiber is a conical fitting allowing the monofilament to be inserted in a puncture needle. Radiation with a power 0.4 mW is administered in the subarachnoid space lumbarly or suboccipitally four to six times, 30-60 minutes per session, with sessions every two or three days. Laser therapy of this type was used on 186 patients with the cerebrospinal form of disseminated sclerosis in the phase of manifestation with frequently recurring or constantly progressing course of the disease, not responding to the usual form of treatment. The patients had suffered from the disease for one to 26 years. The treatment was generally effective, arresting further progress of the disease in most cases. All patients tolerated the treatment well.

### **Laser Therapy of Refractory Gastric Ulcers: Biogenic Amine and Cyclic Nucleotide Correlates**

917C0636A Kiev *VRACHEBNOYE DELO* in Russian No 1, Jan 91 pp 24-27

[Article by A. S. Loginov, G. N. Sokolova, I. Ye. Trubitsyna, S. V. Sokolova, Ye. P. Markin and G. G.

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[Abstract] A comparative analysis was conducted on the levels of cAMP, cGMP, serotonin, histamine and adenylyl cyclase (AC) activity in the gastric mucosa of healthy control subjects and patients with refractory gastric ulcers. The latter cohort was divided into groups managed by conventional chemotherapy and chemotherapy in combination with endoscopic copper laser therapy (10-15 J/treatment, three to six treatments). The results showed that cAMP and AC were significantly depressed in the 130 male and female 32- to 61-year-old patients in

comparison with control findings. Serotonin was significantly elevated in the patient group, cGMP was insignificantly depressed, and histamine was unaffected. Best therapeutic effects were obtained in the laser group and the clinical benefit correlated with the most pronounced changes in the parameters of interest. A single laser irradiation resulted in a 2.6-fold increase of serotonin and a 1.7-fold increase in histamine at the edge of the lesion in comparison with the levels in the gastric mucosa of healthy subjects. The corresponding elevations in cAMP, cGMP and AC were 2-, 1.2- and 1.1-fold, respectively. Furthermore, laser therapy induced an increase in the histamine/serotonin ratio to 7.8 (vs. 6.0 control value and 4.5 at lesion site), and raised the cAMP/cGMP ratio from 1.47 at lesion site to 2.9. These findings indicate that copper laser therapy facilitated gastric ulcer healing by correction of deranged pathophysiologic mechanisms.

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